



**Buffer Zone  
Sampling and Analysis Plan  
FY04 Addendum #BZ-04-01  
IHSS Group 900-11, IHSS 155 Inner Lip Area  
and Associated Remediation Approach**



**December 2003**

BZ-A-000648

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Approval received from the U.S. Environmental Protection Agency  
December 11, 2003.  
Approval letter contained in the Administrative Record.

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## ACRONYMS

|        |  |
|--------|--|
| AL     | action level                                       |
| AOC    | area of concern                                    |
| BZ     | Buffer Zone  |
| BZSAP  | Buffer Zone Sampling and Analysis Plan             |
| DOE    | U.S. Department of Energy                          |
| EPA    | U.S. Environmental Protection Agency               |
| FY     | Fiscal Year  |
| HRR    | Historical Release Report                          |
| IHSS   | Individual Hazardous Substance Site                |
| IM/IRA | Interim Measure/Interim Remedial Action            |
| K-H    | Kaiser-Hill Company, LLC                           |
| OU     | Operable Unit                                      |
| PAC    | Potential Area of Concern                          |
| pCi/g  | picocuries per gram                                |
| PCOC   | potential contaminant of concern                   |
| RCRA   | Resource Conservation and Recovery Act             |
| RFCA   | Rocky Flats Cleanup Agreement                      |
| RFI/RI | RCRA Facility Investigation/Remedial Investigation |
| SAP    | Sampling and Analysis Plan                         |

## 1.0 INTRODUCTION

This Buffer Zone (BZ) Sampling and Analysis Plan (SAP) (BZSAP) (DOE 2002) Addendum #BZ-04-01 includes Individual Hazardous Substance Site (IHSS) Group-specific information, sampling locations, and potential contaminants of concern (PCOCs) for IHSS 155 (Inner Lip Area) proposed for characterization during Fiscal Year (FY) 04. This BZSAP Addendum is a supplement to the BZSAP (DOE 2002).

The purpose of this SAP is to describe the pre-screen sampling, the confirmation sampling and remedial activities associated with the sampling.

### 1.1 IHSS GROUP 900-11

Respectively, IHSS Group 900-11 consists of the following IHSS Sites and Potential Area of Concern (PAC):

- 112 – 903 Pad
- 140 – Hazardous Disposal Area
- 155 – 903 Lip Area
- SE-1602 – East Firing Range

IHSS 112, the 903 Pad, is currently undergoing remediation and will be addressed via a separate closeout report. IHSS Site 140, the Hazardous Disposal Area, was proposed for No Further Action (NFA) in 1998 (DOE 1992-2002). PAC SE-1602, the East Firing Range, will be addressed via a separate SAP Addendum. IHSS Site 155, the 903 Lip Area, will be addressed via two documents. This BZSAP Addendum (BZ-04-01) addresses the 903 Inner Lip Area, while the 900-11 Interim Measure/Interim Remedial Action (IM/IRA) will address the 903 Outer Lip Area.

The 903 Inner Lip Area (IHSS 155) is primarily an area east and south of the 903 Pad where wind and rain spread plutonium-contaminated soil from the 903 Pad Area. The locations of the IHSSs and PACs in the vicinity are shown on Figure 1.

Several limited excavations have removed some of the contaminated soil from the 903 Inner Lip Area. However, results from the Operable Unit (OU) 2 Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) sampling and analysis and the Site Characterization Report for the 903 Drum Storage Area, 903 Lip Area, and the Americium Zone (DOE 1995) confirm that radionuclide-contaminated soil remains. The contamination is primarily attributed to wind dispersion from the 903 Pad and stormwater-related surface soil erosion.

The PCOCs for IHSS 155 are listed in Table 1. Proposed new sampling locations are the starting point for IHSS Group characterization. After characterization starts, the number and type of samples may change based on sampling results. Changes to sampling specifications will be considered in consultation with the regulatory agencies.

**Table 1**  
**IHSS Group 900-11, IHSS 155**

| <b>IHSS Group</b> | <b>IHSS/PAC/UBC Site</b> | <b>PCOCs</b>  | <b>Media</b> | <b>Data Source</b>   | <b>Sampling Method</b> |
|-------------------|--------------------------|---------------|--------------|--|------------------------|
| 900-11            | IHSS 155                 | Radionuclides | Surface soil | HRRs (DOE 1992-2002)<br>Process knowledge (IASAP [DOE 2001]) | Composited grab        |

## 2.0 EXISTING CHARACTERIZATION INFORMATION

Existing information and data for this IHSS are available in Appendix C of the BZSAP (DOE 2002) and the Historical Release Reports (HRRs) (DOE 1992-2002). Existing gamma spectroscopy data associated with the IHSS 155 plutonium-239/240 activities are presented on Figure 2. These data represent the starting point for determining further characterization sampling. Pre-screen samples are currently being collected and analyzed.

## 3.0 GRID CELL SAMPLING

A grid cell approach will be utilized around the perimeter of the 903 Pad and the area immediately east of the 903 Pad due to the following:

- Historical information indicates fill material may have been placed and soil disturbance may have occurred, therefore, the potential contamination may not follow the pattern of typical erosion deposition;
- Limited and variable characterization data; and
- Proximity to the 903 Pad.

Grid sizes for this area of the 903 Inner Lip area are based on the geostatistical methods presented in the BZSAP (DOE 2002). The grid size for the 903 Inner Lip area will be 42-foot squares. The grid locations and orientation are located on Figure 3. Not all of the 903 Inner Lip area is included in the grid cell sampling approach. The portion south of grid cells AA12 through J12 and K11 through U11 of the 903 Inner Lip area is addressed using a kriging technique, described in a later section, that better accounts for the wind, rain, and erosional deposition that occurred in this area.

Note that the 903 Pad is currently undergoing remediation and confirmation sampling; therefore, no additional samples will be collected in this area.

The combination of previous characterization data and “pre-screen” characterization sampling effort will determine whether remediation activities are required within grid cell locations. If previous characterization sample data collected within a grid cell show soil concentrations above their respective action levels (ALs), as described in the Rocky Flats Cleanup Agreement (RFCA) Attachment 5, 2003 Modification, those specific grid cells will be remediated. If previous characterization sample data collected within a grid cell show soil concentrations below their respective ALs; those specific grid cells will be sampled using the “pre-screen” sample methodology described below. Radiological soils samples will provide sufficient data to determine whether the contaminant concentration exceeds ALs. On Figure 3, the boundary of the

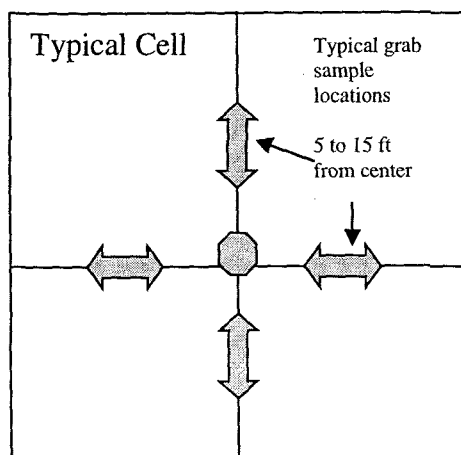
grid illustrates the potential area of remedial action associated with the pre-screen methodology. The remaining portion south of grid cells AA12 through J12 and K11 through U11 will be addressed using the kriging technique.

### 3.1 Pre-screen Methodology

If there are no previous sample characterization data within grid cells or the previous characterization sample data shows activity levels below AL, composite pre-screen samples will be collected prior to the remedial action to document contamination levels in each grid cell. Where applicable, soil samples will be collected directly below the clean fill placed to support the 903 Pad remediation project. Remediation decisions will be based on the results of this prescreen sample. If radionuclide activities are below their respective ALs, as described in the RFCA Attachment 5, 2003 Modification, the consultative process will be invoked to develop a remedial approach for those specific grid cells. If radionuclide activities are above their respective ALs, those specific grid cells will be remediated.

Grid cells having existing characterization data indicating soil contamination that exceeds the AL at depths greater than 6 inches, will be excavated to the depths indicated in the Characterization Report for the 903 Drum Storage Area, 903 Lip Area, and the Americium Zone (K-H, June, 2000). Confirmation samples will be collected and analyzed to verify the grid cell has met the remedial objectives.

Each composite sample collected for radiological characterization will consist of five soil aliquots (grab samples) collected from the grid cell as shown below. One aliquot will be collected at the center point of the grid cell and the other four aliquots will be collected from 5 to 15 feet from the center point of the cell along the central axes of the cell. The vertical and horizontal location of the composite sample will be assigned to the center of the cell as surveyed.



Remediation for the grid cell areas will consist of removal of the upper 6 inches of native soil. A composite confirmation sample will be collected from each grid cell after the 6 inches of soil are removed to determine whether the remedial action objectives have been met or additional excavation and confirmation sampling will be necessary. If the composite confirmation analysis indicates the soil is below 50 pCi/g Pu, then the remedial action objectives have been met.

### **3.2 Confirmation Samples**

Confirmation samples will be collected from each grid cell following the removal of the upper 6 inches of soil to verify that the site has met the remedial objectives. If radiological contamination is found above the action levels in the field screening gamma spectroscopy, additional soil will be removed from the grid cell and another confirmation sample will be collected.

Once the field screening indicates that the soil is below the action level, the sample will be sent to the onsite laboratory for gamma spectroscopy. Ten percent of the samples analyzed by gamma spectroscopy will be sent for alpha spectroscopy analysis (LIC ASP-A-003 or EAS-A-002).

Each composite confirmation sample collected for radiological characterization will consist of five soil aliquots (grab samples) collected from the bottom of the excavation in the same manner as the pre-screen sample. One aliquot will be collected at the center point of the cell and the other four aliquots will be collected from 5 to 15 feet from the center point of the cell along the central axes of the cell. The vertical and horizontal locations of the composite sample will be assigned to the center of the cell as surveyed.

All five aliquots will be placed into a disposable bowl and thoroughly mixed. A composite soil sample will be collected from the mixed soil and placed into a 500-cc plastic jar and analyzed by gamma spectroscopy. Field duplicate samples for gamma spectroscopy will be collected at a minimum frequency of one per every 10 grid cells. The field duplicate will be collected and analyzed just as the confirmation sample.

EPA has generated one random grid cell in each north-south column of grid cells from which Kaiser-Hill will provide approximately 50 grams of soil from the composited soils for the confirmation sample from the final depth for that particular cell. This sample will be known as the EPA split sample and will be taken from the following cells: K7, L10, M4, N2, O7, P9, Q4 R11, S11, T3, U2, V6, W7 and X4. At EPA's earliest convenience, it will take custody of the split sample and store it in a lockbox in the T124E sample cooler until shipping it to its Montgomery, Alabama laboratory for analysis by alpha spectroscopy.

### **4.0 DATA EVALUATION (KRIGING)**

Kaiser Hill is currently evaluating the southern portion of the 903 Inner Lip area that contains extensive field HPGe characterization data. The area being kriged is bordered by the grid cells to the north and the existing road to the south and east. The western limits include the extent of the HPGe data, as shown on Figure 2. Preliminary kriging efforts indicated the need for additional HPGe data to more accurately bound the limits of remediation in this area. These data are currently being collected.

Geostatistical methods have been widely applied in environmental characterization (Myers 1997). Geostatistical approaches customize the analysis to account for many of the unique features of the contaminant distribution at a particular site that a more representative model can be produced. The kriging process used in geostatistical studies uses optimal estimation (minimum error), which ensures a high quality to the model. In addition, geostatistical techniques provide a measure of the confidence in the estimations.



Once the data have been evaluated, the results will be discussed and path forward determined via the consultative process and documented in a Contact Record.

## **5.0 REFERENCES**

Rockwell International, 1989, Interim Status Closure Plan Solid Waste Management Unit 15, Rocky Flats Plant, Golden, Colorado.

DOE, 1992-2002, Historical Release Reports for the Rocky Flats Plant, Golden, Colorado.

DOE, 1995. Final Phase II RFI/RI Report, 903 Pad, Mound, East Trenches Area, Operable Unit No. 2, Rocky Flats Environmental Technology Site, Golden, Colorado.

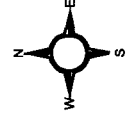
DOE, 2001, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June.

DOE, 2002. Final Buffer Zone Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, March.

Myers, J.C. 1997. Geostatistical Error Management: Quantifying Uncertainty for Environmental Sampling and Mapping. <http://www.gemdqos.com>. New York: Van Nostrand Reinhold.

**Figure 1**  
**IHSS Group 900-11**  
**Location Map**

| KEY |               |
|-----|---------------|
|     | IHSS          |
|     | PAC           |
|     | Building      |
|     | Demolished    |
|     | Standing      |
|     | Paved road    |
|     | Dirt road     |
|     | Stream        |
|     | Lake          |
|     | Site Boundary |



800 0 800 Feet

Scale = 1:14,500  
State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD 27

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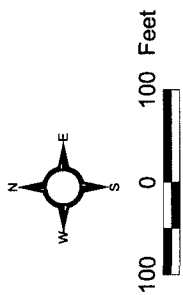
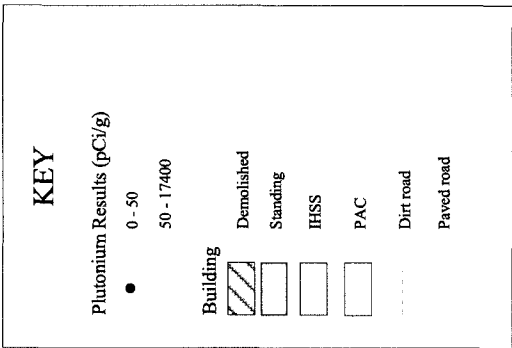
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**Figure 2**  
**IHSS Group 900-11**  
**Existing Plutonium-239/240**  
**Sample Locations**



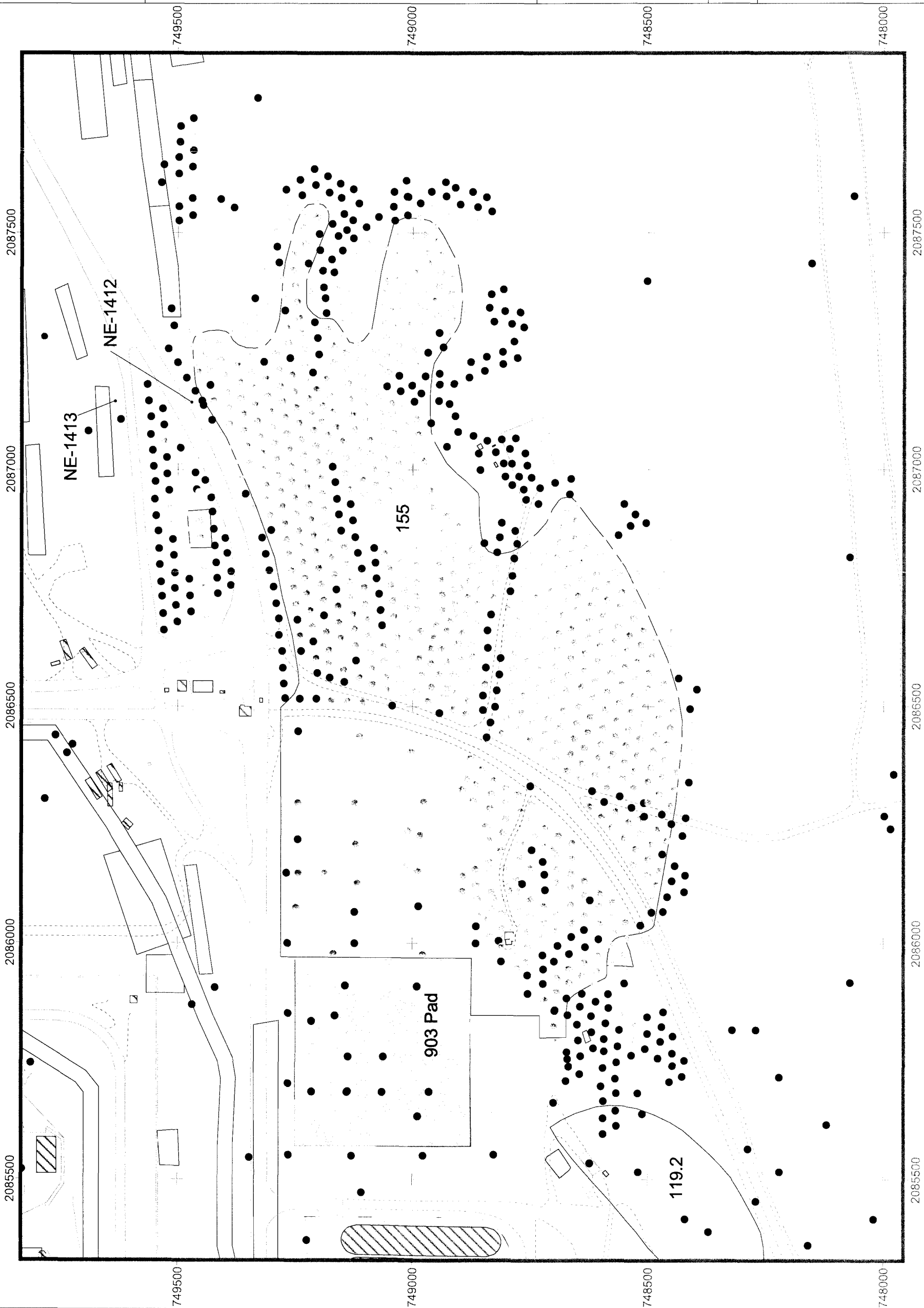
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 Datum: NAD 27

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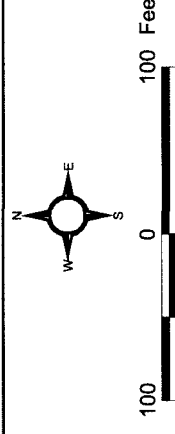
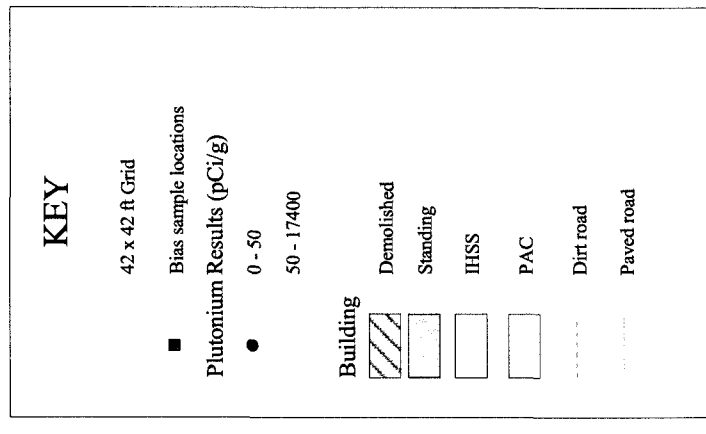
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### Figure 3 IHSS Group 900-11 Initial Grid Locations



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